

REMARKS

By this document, no amendment was made. Thus, Claims 1-5 remain pending and are presented for further examination.

I. Discussion of Objection to the Title and Oath or Declaration

On page 2 of the Office Action, the Examiner objected to the title of the invention for not being descriptive, and requested a new title that is clearly indicative of the invention. In response to this objection, the Applicant has amended the title accordingly. Further, the Examiner objected to the inventor declaration for not identifying the mailing of post office address of each inventor. In response to this objection, the Applicant has enclosed herewith an application data sheet to indicate the mailing or post office address of the inventor. The Applicant submits that the objections are now overcome.

II. Discussion of Rejection of Claims 1, 2, 4, and 5 Under 35 U.S.C. § 103(a)

On page 1 of the Office Action, the Examiner rejected Claims, 1, 2, 4, and 5 for being unpatentable over U.S. Patent Pub. No. US2002/0102073 A1 to Shirakawa in view of US2002/0197023 A1 to Serizawa. In rejecting the claims, the Examiner stated that:

Shirakawa discloses an optical connector with a receptacle connector, a plug connector fitted inside the receptacle connector and a light emitting diode. Additionally, Shirakawa discloses a light emitting diode and a light-receiving element to be arranged side by side that the first optical fiber is connected to the light emitting diode and the second optical fiber is connected to the light-receiving element. But Shirakawa fails to specifically disclose the optical fiber to be arranged so that the end face of the fiber is positioned deeper than the connecting face but, from the figure in the patent application, figure 14 specifically and figures 1 and 16, it can be observed that the end face of the fiber is positioned deeper than the connecting face from the position of where the locking arm locks into place with the receptacle. Shirakawa also fails to disclose a convergent lens to converge the light emitted by the light emitting diode for the purpose of creating a smaller numerical aperture for the light emitting diode than the optical fiber. However, Serizawa does disclose an optical connector with a lens in a sleeve for the purpose of altering the numerical aperture in the sleeve. Serizawa however, also discloses the alteration of the numerical aperture to cause the numerical aperture of the sleeve to be larger than the numerical aperture of the fiber. However, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have used a lens that altered the numerical aperture of the light-emitting element in order to obtain the necessary values for the purpose of the optical connector.

For the reason set forth below, the Applicant respectfully disagrees with the Examiner's findings and determination that Claims 1, 2, 4, and 5 are unpatentable over Shirakawa in view of Serizawa.

A. Brief Description of U.S. Patent Pub. No. US2002/0102073 A1 to Shirakawa

Shirakawa describes a receptacle of optical connector that includes a connector housing, an optical element module having an optical element, and sleeve and cap members. *Shirakawa at para. 0031*. An engaging portion is provided on the cap member for holding the cap member. *Id. at para. 0032*. The cap member is provided with a projecting portion projecting inward the terminal led-out portion toward the terminal. *Id. at para. 0033*. The cap member is provided with a pushing projection to push the optical element module toward the sleeve member. *Id. at para. 0034*.

B. Brief Description of U.S. Patent Pub. No. US2002/0197023 A1 to Serizawa

Serizawa describes an optical connector, a sleeve, and a manufacturing method for the sleeve for making it possible to decrease a light power loss, to widen a transmission margin when light communication is executed. *Serizawa at para. 0031*. The optical connector comprises sleeves capable of providing optical connection of optical fiber and reception and transmission modules. *Id. at para. 0032*. In one embodiment, the sleeve is made up of a light transmission member consisting of a core and a clad having a smaller refractive index than the core has and a cylindrical and coat-like holder placed in an outer peripheral margin of the light transmission member. *Id. at para. 0037*. A collimator lens is formed at least at one end of the light transmission member 35. *Id. at paras. 0044 and 0172 (see, e.g., Elements 25 and 35 of Fig. 2)*. If the collimator lens is provided on the incidence side, such light originally radiated to the clad 34 can also be transmitted. *Id.* If the collimator lens is provided on the emission side, light can be gathered. *Id.* Finally, as described with reference to Figures 1 to 8 of Serizawa, the numerical aperture "N.A. of the sleeve 25 is larger than that of the optical fiber 40, so that the light reception amount of the sleeve 25, namely, the light reception limit becomes large and the total efficiency is improved." *Id. at para. 0159*. For example, the N.A. of the sleeve 25 may be set to $0.5 < \text{N.A.} < 1$. *Id. at para. 0160*.

C. The Law of Obviousness

To establish a *prima facie* case of obviousness, three basic criteria must be met: (1) there must be some suggestion or motivation to combine the reference teachings, (2) there must be a reasonable expectation of success, and (3) the references when combined must teach or suggest all of the claim limitations. See *M.P.E.P.* § 2143. All words in a claim must be considered in judging the patentability of the claim against the prior art. See *M.P.E.P.* §2143.03. It is well settled that "a showing of a suggestion, teaching or motivation to combine the prior art references is an 'essential component of an obviousness holding'." See, e.g., *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2d 1456, 1459 (Fed. Cir. 2000). The Examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references." *In re Fitch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992). "Determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998).

The Applicant submits that the Examiner failed to establish a *prima facie* case of obviousness of Claims 1, 2, 4 and 5, because the Examiner did not show (1) some suggestion or motivation to combine the reference teachings, and (2) that the references when combined teach or suggest all of the claim limitations, as discussed in subsections D and E below.

D. Combination of Shirakawa and Serizawa Fails to Teach or Suggest a Convergent Lens for Converging Light Emitted from the Light Emitting Element

Claim 1 recites an optical connector comprising a convergent lens for converging light emitted from the light emitting element so as to provide an incident numerical aperture smaller than the numerical aperture of the multimode optical fiber and making this light incident to the multimode optical fiber arranged in the receptacle connector. On the other hand, and as recognized by the Examiner, Shirakawa "fails to disclose a convergent lens to converge the light emitted by the light emitting diode for the purpose of creating a smaller numerical aperture for the light emitting diode than the optical fiber." *O.A. at page 3*. However, the Examiner argued

that "Serizawa does disclose an optical connector with a lens¹ in a sleeve for the purpose of altering the numerical aperture in the sleeve." *Id.* The Examiner further argued that Serizawa discloses the alteration of the numerical aperture to cause the numerical aperture of the sleeve to be *larger* than the numerical aperture of the fiber.

The Applicant submits that the Examiner did not show that the combined teachings of Shirakawa and Serizawa discloses all limitations of Claim 1 because, as admitted by the Examiner, such combination fails to teach a "convergent lens for converging light emitted from the light emitting element so as to provide an incident numerical aperture smaller than the numerical aperture of said multimode optical fiber," as recited in Claim 1. The Applicant reminds the Examiner that all words in a claim must be considered in judging the patentability of the claim against the prior art. *See M.P.E.P. §2143.03.* Recognizing that Serizawa teaches a collimator lens instead of a *convergent lens*, and discloses that the incident numerical aperture is larger instead of *smaller* than that of the optical fiber, the Applicant submits that establishing an obviousness rejection of Claim 1 based on such combined teachings is not supported by law. Thus, neither Shirakawa nor Serizawa, either alone or in combination, teach or suggest an optical connector comprising a light emitting element having a convergent lens, as recited in Claim 1.

E. Serizawa Teaches Away from Including a Convergent Lens for Converging Light Emitted from the Light Emitting Element

As noted above, Serizawa discloses a numerical aperture N.A. of the sleeve 25 as larger than that of the optical fiber 40, so that the light reception amount of the sleeve 25, namely, the light reception limit becomes large and the total efficiency is *improved*. *Id. at para. 0159.* The Applicant submits that Serizawa's recommendation for improvement to one of ordinary skill in the art is to select the numerical aperture as larger than that of the optical fiber. Thus, one of ordinary skill in the art would have not been motivated to reverse the relative numerical apertures taught by Serizawa, because according to Serizawa such reversal would be a non-improvement. Thus, Serizawa would have likely discouraged one of ordinary skill in the art from attempting the invention recited in Claim 1.

¹ Applicant notes that the Examiner correctly states that Serizawa's discloses of a "lens", but Serizawa does not disclose a "convergent lens" as recited in Claim 1.

As noted in the specification of the present application, the inventor recognized benefits from selecting a converging lens with such claimed characteristics for his invention. For example, when optical communication occurs within a vehicle, a coupling loss is caused in a connecting portion of an optical fiber and bending loss is caused in a bending portion of the optical fiber. *Spec. at pp. 4-5*. When such loss is sufficiently large, little or no light may be transmitted from a light-transmitting element to a light-receiving element. *Id. at page 5*. The inventor solved this problem by, at least in part, arranging a convergent lens 8 in a receptacle connector 1. *Id. at page 10 (see, e.g., Fig. 1)*. The convergent lens is configured to converge light from the light emitting element 10 so as to provide an incident numerical aperture that is smaller than the numerical aperture of the optical fiber. On the other hand, Serizawa discloses a collimator lens that is incapable of providing the benefits of the convergent lens of Claim 1, because the collimator lens is configured to have a numerical aperture of the sleeve 25 as larger than that of the optical fiber 40. There is no objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. See, *In re Fitch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992).

In view of the foregoing, there would have been no motivation in either Shirakawa or Serizawa to combine the teachings of the references and recognize the invention recited in Claim 1. Thus, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of these references to recognize the invention of Claim 1. Since Claims 2, 4 and 5 depend from Claim 1 above, the Applicant submits that those claims are allowable for at least the same reasons.

III. Discussion of Rejection of Claim 3 Under 35 U.S.C. § 103(a)

On page 3 of the Office Action, the Examiner rejected Claim 3 under 35 U.S.C. § 103(a) as being unpatentable over Shirakawa in view of Serizawa as applied to Claim 1, and further in view of U.S. Patent No. 5,923,805 to Anderson et al. The Examiner does not allege that Anderson teaches the convergent lens as recited in Claim 1.

Since Anderson does not cure the deficiencies of Shirakawa and Serizawa, the Applicant submits that the combination of all 3 references fail to teach or suggest all of the limitations of Claim 1. As such, Claim 1 is allowable for at least the reasons discussed above. Since Claim 3

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depends on Claim 1, the Applicant submits that Claim 3 is also allowable for at least the same reasons.

IV. CONCLUSION

Applicant has endeavored to address all of the Examiner's concerns as expressed in the Office Action. Accordingly, amendments to the claims, the reasons therefor, and arguments in support of patentability of the pending claim set are presented above. Any claim amendments which are not specifically discussed in the above remarks are made in order to improve the clarity of claim language, to correct grammatical mistakes or ambiguities, and to otherwise improve the clarity of the claims to particularly and distinctly point out the invention to those of skill in the art. Finally, Applicant submits that the claim limitations above represent only illustrative distinctions. Hence, there may be other patentable features that distinguish the claimed invention from the prior art.

In view of the foregoing, Applicant respectfully requests reconsideration and withdrawal of the outstanding rejections and, particularly, that all claims be allowed. If the Examiner finds any remaining impediment to the prompt allowance of these claims that could be clarified with a telephone conference, the Examiner is respectfully invited to call the undersigned.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,
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